Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Journal of Tissue Viability 31 (2022) 424–430

Contents lists available at ScienceDirect

Journal of Tissue Viability

journal homepage: www.elsevier.com/locate/jtv

How the COVID-19 pandemic influences the prevalence of pressure injuries in the Czech Republic: A nationwide analysis of a health registry in 2020

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ARTICLE INFO

Keywords:
COVID-19
Pressure injuries
Prevalence
Epidemiology
Inpatient care
Hospitalization

ABSTRACT

Background: COVID-19 significantly influences the overall patient status and, in severe symptomatology, the ability to move and the low oxygenation of the tissue for the ventilated patient in Intensive Care Units (ICU). There is a higher risk for Pressure injuries (PIs) development.
Objectives: The nationwide analyses of the National health register aimed to compare the prevalence of PIs reported before the pandemic COVID-19 started and during the pandemic in 2020.
Method: A retrospective, nationwide cross-sectional analysis of data regarding the STROBE checklist collected by the National Health Information System (NHIS), focusing on the PIs reporting based on the International Classification of Diseases (ICD-10) diagnoses L89.0-L89.9 for PIs in 2020. The data from the pandemic period of COVID-19 in 2020 were compared to the prevalence of PI cases in the period 2010–2019 in the Czech Republic in all hospitalized patients.
Results: The total number of admissions for L89 in 2020 was 14,441, of which 1509 (10.4%) also had COVID-19. In the ICU were 4386 admissions, 12.1% of which also had COVID-19. A higher proportion of PIs is observed in patients hospitalized with COVID-19 than in patients without COVID-19 (2.62% vs 0.81%, respectively 1.05% vs 0.46% when standardized to the 2013 ESP = European Standard Population). In patients hospitalized in ICU, 3.68% with COVID-19 had PIs vs 1.42% without COVID-19 had PIs (1.97% vs 0.81% using the 2013 ESP).
Conclusion: The national health registers analyses have proven that the prevalence of PIs was higher among patients hospitalized with the SARS-CoV-2 infection.

1. Introduction

The coronavirus disease (COVID-19) caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) was declared a pandemic on March 11, 2020 by WHO [1], as a growing body of evidence had emerged about its clinical manifestations, complications, and management. Even though SARS-CoV-2 infection primarily affects the lungs and the cardiovascular system, the COVID-19 is considered a syndromic disease that triggered all clinical specialities' attention as its pulmonary symptoms were not sufficiently prognostic for its presence or severity [2,3]. Therefore, extrapulmonary symptoms such as neurologic, gastrointestinal, dermatologic, and oral symptoms led to large-scale debates and required further investigation to reveal their pathophysiologic mechanisms that may help better understand the novel disease and propose effective manoeuvres for its management and prevention [4–17]. As the COVID-19 could cause exceptional health emergencies, increase patient dependency, and require special interventions (e.g., artificial pulmonary ventilation – APV, extracorporeal membrane oxygenation – ECMO and

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https://doi.org/10.1016/j.jtv.2022.06.003
Received 7 April 2022; Received in revised form 6 June 2022; Accepted 12 June 2022
Available online 15 June 2022

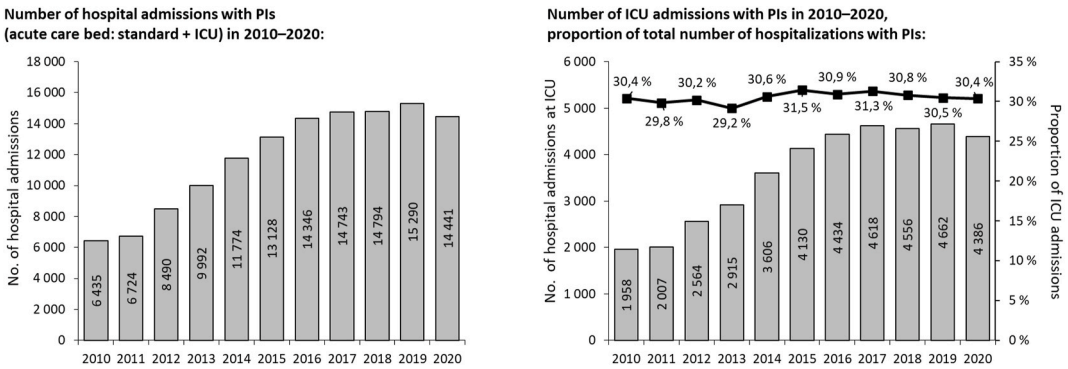

Fig. 1. Number of hospital admissions with PIs in ten years period at standard units and ICUs.

related unique positioning or use of extraordinary devices), patients may more often and quickly develop skin injuries. Another related problem is the infection's severity and prolonged stays in healthcare facilities [18]. On the other hand, it is also a fact that at the time of the COVID-19 pandemic, there was increased pressure on hospitals, increased numbers of patients, and a reduced number of health care staff, which affected the quality of patient care and the possibility to prevent complications, including PIs. As mentioned above, we need to highlight that in patients with the COVID-19, increased immobility and a higher amount of medical devices were used. Thus, from the pathophysiological view, we are aware that PIs are unlikely to occur without impaired mobility and in the case of medical device-related injuries nonetheless. One can expect a higher prevalence of PIs in COVID-19 patients. The current aetiological knowledge confirms that PIs develop due to sustained mechanical loading leading to soft tissue deformation [19].

Thus, this nationwide analysis of the prevalence of pressure injuries related to the COVID-19 was conducted to summarize data reported in the National registers and discuss the possible reasons for the changes in the reported prevalence compared to ten respectively five years before the pandemic.

The study's main objective was to analyze the impact of the COVID-19 pandemic on the prevalence of pressure injuries in the Czech Republic for hospitalized patients.

2. Methods

The retrospective, nationwide cross-sectional data analysis followed the STROBE reporting guideline of data collected by the National Health Information System (NHIS) has been provided [20]. The data are managed by the Institute of Health Information and Statistics of the Czech Republic (IHIS CR) and collected in the National Health Information System (NHIS) and national health registers. The National Registry of Reimbursed Health Services (NRRHS) - contains data of health insurance companies in the hospitalization and outpatient areas, including complete data on reported diagnoses, procedures, and treatments; currently, the data are available for the period 01/2010-06/2021. The data for 2021 is incomplete, and presented analyses include data for 2020. Hospitalizations with pressure injuries (PIs) were identified by reporting L89.0-L89.9 (pressure injury) diagnosis as a principal or secondary hospitalization diagnosis. Hospitalizations with COVID-19 were identified as a principal or secondary hospitalization diagnosis by registering diagnosis U07.1 according to ICD-10 (COVID-19, SARS-CoV-2 infection and virus laboratory proven). The Vertica database was used for the data pre-processing and SPSS for the statistical analysis (IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp). Results are presented as absolute and relative frequencies. The proportion of hospitalizations with PIs was also calculated as age-adjusted rates using the 2013 European Standard Population (ESP) to allow comparison with other works [21].

2.1. Ethical approval

No patients were personally involved in our study. Data were collected in accordance with Act No. 372/2011 Coll., on Health Services and Conditions of Their Provision. Due to this legal mandate, the retrospective analyses did not require either approval by an ethics committee or informed consent from participants. Anonymous data are subsequently published in an aggregated form, so identification of individual patients is not possible. The study procedures were reviewed and approved by the Board of Directors of the IHIS following the requirements of the Ministry of Health of the Czech Republic (no unique IRD number was assigned).

2.2. Strenght and limitations of the study

The main strength is that there were analyzed the nationwide data. The limitation is that the presented data are administrative data from National registries, which are reported from clinical practice, and there is a risk of underreporting.

3. Results and discussion

The prevalence of hospitalizations with reported PIs in the Czech national health registers has been at the same level for a long time, as detailed in Fig. 1 for acute care in total and separately for ICUs in the period 2010–2020.

The annual number of hospitalizations of patients with PIs in the last five years is between 14 and 15 thousand, of which about 4.5 thousand hospitalizations per year are in the ICU. Fig. 1 also shows an increase in reported hospitalizations with PIs after 2014, when new methodological requirements for monitoring and reporting PIs were introduced at the national level. The first hospitalization with COVID-19 was reported in the Czech Republic in March 2020. The proportion of ICU admissions for patients with PIs has been stable at around 30%. If we compare it to another source – Adverse Event Reporting System (AERS) in the Czech Republic [22], there were PIs reported by non-medical healthcare staff with some differences. It must be highlighted that PIs of category I are not commonly reported and identified in medical records, but they are noted in the nursing part of the documentation. For 2018, in total, 48,704 PIs were reported as adverse events; in 2019, it was 48,779, but in 2020, when the COVID-19 pandemic started in the Czech Republic, there was a total of 47,775 PIs as adverse events reported. This may account for the fact that the total number of hospitalized patients tracked in AERS decreased due to the limited elective care. The structural differences in the prevalence of pressure ulcers reported in AERS and NRRHS are because a patient appears once in NRRHS regardless of the number of PIs. To the NRRHS, the data are reported by physicians or administrative staff (DRG coders) according to the ICD-10 codes, and lower PIs categories are not reported as they usually do not require an identifiable medical procedure that could be reimbursed. Introducing a

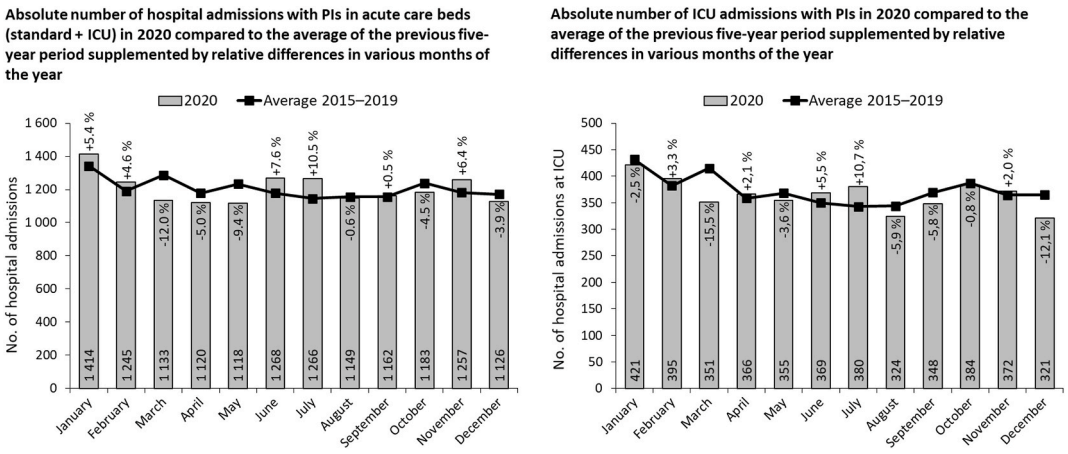

Fig. 2. Number of hospital admissions with PIs in 2020 compared to the previous five-year period.

pandemic to an environment that is potentially at-risk for adverse events may result in unintended patient safety and quality concerns. We use the learning health system framework described above used in AERS [22] to motivate our understanding of the impact of the COVID-19 pandemic on the incidence of Hospital-Acquired Pressure Injuries (HAPIs) within our health system. Using a retrospective, observational design, we used descriptive statistics to evaluate trends in HAPI from March to July 2020. Hospital-acquired pressure injury numbers have fluctuated from a steady increase from March–May 2020, hitting a peak high of 90 cases in the month of May. However, the trend in the total all stage HAPIs began to decline in June 2020, with a low of 51 in July, the lowest number since March 2020. Patients evaluated in this study did not have a longitudinal increase in HAPIs from March–July 2020 during the COVID-19 pandemic, despite similarities in illness severity between the two-time points. Our experience has demonstrated the ability of our organizational leaders to learn quickly during a crisis. We are also aware of it in the Czech Republic, and because of this, we have analyzed data from NRRHS before and during the pandemic. Patient adverse events, such as Hospital Acquired Pressure Injuries (HAPIs), are problematic, and it is also clear when we compare data for the Czech Republic from NRRHS and AERS. We expected an increase in the number of PIs in patients with COVID-19. Still, on the other hand, we also expected there could be underreported data as healthcare professionals were exhausted, did not have time to report pieces of important information and the nurse bed ratio was different than before the pandemic. As the number of PIs reported in AERS by non-medical healthcare professionals is higher than in NRRHS, we hope nurses are more accurate in reporting even if they are swamped and have to do a lot of new interventions, especially at ICUs, e.g., prone positioning. As Johnson suggests (in the study made on a sample of 130 patients), including a certified wound and skincare nurse on a multi-professional prone-positioning team significantly reduced the prevalence of PIs developing in patients infected with SARS-CoV-2 [23].

When we compared another study, where a total of 101 inpatients and 171 episodes were studied, the prevalence of PI episodes was 6%, and the cumulative incidence was 2.9% during the first wave of COVID-19. The risk of acute wounds was four times higher in the COVID-19 patient group (OR = 4.1; 95% CI, 2.1–8.0; $p < 0.001$). The most common locations were sacrum and heels. They also confirmed that HAPIs are significantly associated with the diagnosis of arterial hypertension and diabetes mellitus in patients with COVID-19 diagnosis [24]. These results correspond with our findings.

In Fig. 2, we present the number of hospitalizations with PIs for 2020 compared to the previous five-year period (2015–2019) by month of admission. While the total number of hospital admissions in 2020 decreased by −15.6% compared to the previous five-year period, the number of admissions with PIs decreased by only −0.1%.

The situation is similar for ICU beds - the total number of ICU admissions in 2020 decreased by −9.7% compared to the previous five-year period, while the number of ICU admissions with PIs decreased by −2.1%. It should also be noted that elective care was reduced in March 2020 and partially resumed in June 2020. The complete restoration of elective care in all the Czech hospitals has not yet been implemented due to the coming new pandemic waves (status as of January 2021). To identify the potential impact of COVID-19 and the associated prevalence of PIs, we conducted an analysis of hospital admissions for patients with and without SARS-CoV-2 infection, again by month in 2020, as shown in Fig. 3. Of the total number of

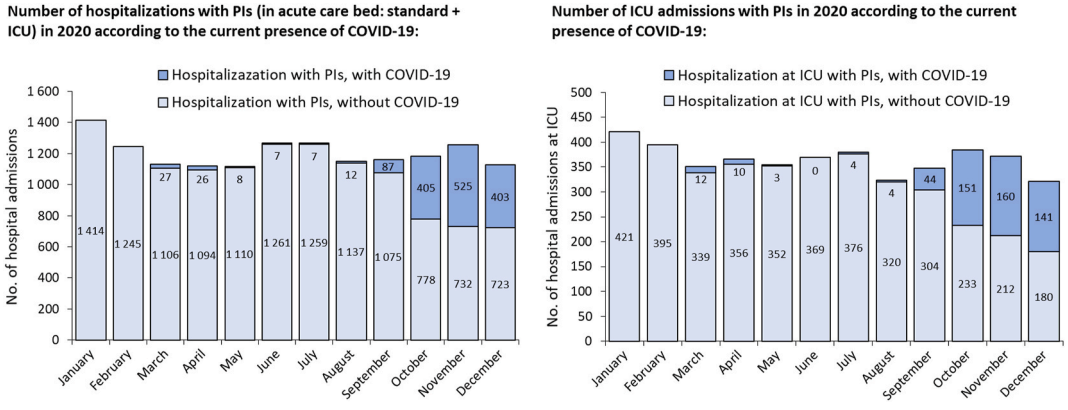

Fig. 3. Number of hospitalizations with PIs and COVID-19 in 2020.

Table 1
The main reasons for hospitalization with PIs (L89) according to the presence of COVID-19 (U07.1) by ICD-10 chapters in 2020.

ICD-10 Chapters	L89 without U07.1 (N = 12,932)	L89 with U07.1 (N = 1509)
I Certain infectious and parasitic diseases	11.2%	5.9%
II Neoplasms	3.8%	1.0%
III Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	1.6%	0.9%
IV Endocrine, nutritional and metabolic diseases	5.3%	2.6%
V Mental and behavioural disorders	0.9%	0.7%
VI Diseases of the nervous system	2.0%	1.1%
VII Diseases of the eye and adnexa	<0.1%	0.1%
VIII Diseases of the ear and mastoid process	<0.1%	–
IX Diseases of the circulatory system	15.3%	8.1%
X Diseases of the respiratory system	14.0%	55.5%
XI Diseases of the digestive system	6.5%	3.7%
XII Diseases of the skin and subcutaneous tissue	7.1%	2.5%
XIII Diseases of the musculoskeletal system and connective tissue	2.1%	1.1%
XIV Diseases of the genitourinary system	14.2%	6.4%
XV Pregnancy, childbirth and the puerperium	–	–
XVI Certain conditions originating in the perinatal period	<0.1%	–
XVII Congenital malformations, deformations and chromosomal abnormalities	<0.1%	–
XVIII Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	1.5%	1.5%
XIX Injury, poisoning and certain other consequences of external causes	10.3%	5.8%
XX External causes of morbidity and mortality	–	–
XXI Factors influencing health status and contact with health services	4.2%	2.9%
XXII Codes for special purposes	<0.1%	0.4%

hospitalizations with PIs in 2020 (n = 14,441), 10.4% of patients also had COVID-19.

Of the total number of ICU admissions with PIs in 2020 (n = 4386), 12.1% of patients had COVID-19. The average age of patients hospitalized in acute bed care (standard + ICU) with PIs and without COVID-19 was 76.5 ± 13.1 years, whereas the average age in patients with both PIs and COVID-19 was 76.8 ± 11.3 years. In a study by Montgomery et al. [25], from a total of 23,093 patients, only 247 had pressure injuries, and 1053 patients had a positive COVID-19 diagnosis. In this study, the generalized estimating equation model was used, and diagnosis of COVID-19, age, male gender, risk of mortality, severity of illness, and length of stay were statistically significant factors associated with the development of HAPIs [25].

The most frequent reasons for hospitalization in patients with PIs and concurrently without COVID-19 were cardiovascular diseases (15.3%) and genitourinary diseases (14.2%). Patients with both PIs and COVID-19 were hospitalized mainly due to respiratory problems (55.5%), followed by cardiovascular diseases (8.1%) and genitourinary diseases (6.4%), see Table 1.

A detailed overview of the main and secondary diagnoses in patients with PIs and with or without COVID-19 is presented in Table 2.

As we are aware, some codes are not commonly used internationally. Some statuses are not considered diagnoses; we wanted to make more detailed analyses. The most frequent reasons for hospitalization in patients with PIs and concurrently without COVID-19 in our study were cardiovascular diseases (15.3%), genitourinary diseases (14.2%), respiratory diseases (14.0%), and certain infectious and parasitic diseases (11.2%), and injuries (10.3%). Patients with both PIs and COVID-19

Table 2
The most frequent main and secondary diagnoses in patient with PIs (L89) with or without COVID-19 (U07.1).

The most frequent main diagnoses in patients with L89 and U07.1 (N = 1509):		N (%)	The most frequent main diagnoses in patients with L89 and without U07.1 (N = 12,932):		N (%)
J12	Viral pneumonia, not elsewhere classified	633 (41.9%)	N39	Other disorders of urinary system	1196 (9.2%)
J06	Acute upper respiratory infections of multiple and unspecified sites	72 (4.8%)	A41	Other sepsis	957 (7.4%)
N39	Other disorders of urinary system	64 (4.2%)	J18	Pneumonia, unspecified organism	826 (6.4%)
A41	Other sepsis	52 (3.4%)	L89	Pressure ulcer	761 (5.9%)
J96	Respiratory failure, not elsewhere classified	48 (3.2%)	S72	Fracture of femur	654 (5.1%)
S72	Fracture of femur	43 (2.8%)	I50	Heart failure	563 (4.4%)
I50	Heart failure	36 (2.4%)	I70	Atherosclerosis	437 (3.4%)
J18	Pneumonia, unspecified organism	34 (2.3%)	Z50	Care involving use of rehabilitation procedures	391 (3.0%)
I70	Atherosclerosis	32 (2.1%)	E86	Volume depletion	298 (2.3%)
Z22	Carrier of infectious disease	30 (2.0%)	I63	Cerebral infarction	272 (2.1%)
The most frequent secondary diagnoses in patients with L89 and U07.1 (N = 1509):		**N (%)**	**The most frequent secondary diagnoses in patients with L89 and without U07.1 (N = 12,932):**		**N (%)**
Z29	Encounter for other prophylactic measures	1195 (79.2%)	I10	Essential (primary) hypertension	5522 (42.7%)
I10	Essential (primary) hypertension	643 (42.6%)	E11	Type 2 diabetes mellitus	3479 (26.9%)
E11	Type 2 diabetes mellitus	448 (29.7%)	B96	Other bacterial agents as the cause of diseases classified elsewhere	3348 (25.9%)
N39	Other disorders of urinary system	373 (24.7%)	N39	Other disorders of urinary system	2738 (21.2%)
B96	Other bacterial agents as the cause of diseases classified elsewhere	342 (22.7%)	R26	Abnormalities of gait and mobility	2615 (20.2%)
J96	Respiratory failure, not elsewhere classified	325 (21.5%)	I48	Atrial fibrillation and flutter	2565 (19.8%)
I48	Atrial fibrillation and flutter	295 (19.5%)	U50[a]	Motor function impairment	2382 (18.4%)
R26	Abnormalities of gait and mobility	294 (19.5%)	E86	Volume depletion	2278 (17.6%)
E87	Other disorders of fluid, electrolyte, and acid-base balance	277 (18.4%)	E87	Other disorders of fluid, electrolyte, and acid-base balance	2181 (16.9%)
J12	ViroViral pneumonia, not elsewhere classified	269 (17.8%)	I25	Chronic ischemic heart disease	2021 (15.6%)

[a] Supplementary code specific for the Czech Republic.

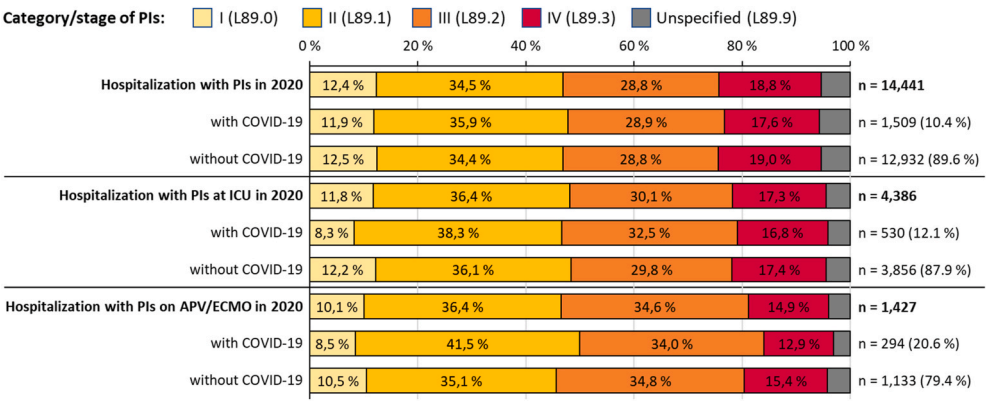

Fig. 4. Categories of PIs for hospital admissions in 2020.

were hospitalized mainly due to respiratory problems (55.5%), followed by cardiovascular diseases (8.1%) and genitourinary diseases (6.4%). Frequency of secondary diagnoses (comorbidities) in patients with PIs were similar regardless of the concurrence with COVID-19: primary hypertension (I10; 42.7% in patients without COVID-19 vs 42.6% in patients with COVID-19), type 2 diabetes mellitus (E11; 26.9% vs 29.7%), disorders of urinary system (N93; 21.2% vs 24.7%), abnormalities of gait and mobility (R26; 20.2% vs 19.5%), atrial fibrillation and flutter (19.8% vs 19.5%), dehydration (E86; 17.6% vs 17.8%), chronic ischaemic heart disease (I25; 15.6% vs 13.7%), congestive heart failure (I50; 10.2% vs 11.9%), and chronic kidney disease (N18; 10.2% vs 11.4%).

In a study by Nieto-Garcia et al. [24], diabetes mellitus and arterial hypertension were identified as the main associated comorbidities in patients with COVID-19 diagnosis and PIs, which corresponds with our findings. Another study confirms the same results that in patients with COVID-19 hypertension, diabetes mellitus, and obesity are associated with the number of ICU admissions and poor prognosis [26].

In COVID-19 ICU patients in a study by Gannon et al. [27], skin injury was a frequent complication encountered during their admission. They identified HAPIs, Moisture-Associated Skin Damage (MASD), or Medical device-related pressure injuries (MDRPI) in 64% of 100 patients. The skin injuries were more frequently reported in patients supported with ECMO [26].

We can see some differences also in our data when comparing standard and intensive acute care (standard + ICU) versus only ICU patients with reported COVID-19 and PIs. Of the total number of hospitalizations with PIs in 2020 (n = 14,441), 4386 (30.4%) were ICU admissions; specifically, 1399 (9.7%) with artificial pulmonary ventilation and 28 (0.3%) with ECMO. Of the total number of hospitalizations with PIs and COVID-19 in 2020 (n = 1509), 530 (35.1%) were ICU admissions; more specifically, 281 (18.6%) with artificial pulmonary ventilation and 13 (0.9%) with ECMO. When comparing the incidence of PIs in hospital admissions in 2020 with and without a reported SARS-CoV-2 infection, we do not find much difference in the proportion of PI categories. There was not much difference when we compared the category of PIs in 2020 by hospitalized patients without and with COVID-19 in acute care (standard + ICU). Both diagnosis PIs and COVID-19 were identified by 1509 (10.4%) of all hospitalized patients (n = 14,441) in 2020 in acute care (standard + ICU). For example, it was 34.5% vs. 35.9% in category II, and 28.8% vs. 28.9% in category III is mainly referred categories. When we consider only hospitalization in ICU, there is no statistically significant difference between several categories of PIs by hospitalized patients with or without COVID-19 in ICU. In mainly referred categories of PIs, it was a difference of 36.4% vs. 38.3% in category II and 30.1% vs. 32.5% in category III. In 2020 there were hospitalized 530 patients with PIs and COVID-19; it was 12.1% of all hospitalized patients in ICU (n = 4386) with PIs in 2020 (see Fig. 4 for details).

Table 3
Category/stage of PIs in patients with APV/ECMO.

Category/stage of PIs	Number of hospitalizations with PIs (APV/ECMO) (N = 1427)	Number of hospitalizations with PIs and COVID-19 (APV/ECMO) (N = 294)
Category/stage I	144 (10.1%)	25 (8.5%)
Category/stage II	520 (36.4%)	122 (41.5%)
Category/stage III	494 (34.6%)	100 (34.0%)
Category/stage IV	212 (14.9%)	38 (12.9%)
Category of PI not reported	57 (4.0%)	9 (3.1%)

Abbreviations: APV – artificial pulmonary ventilation, ECMO – extracorporeal membrane oxygenation.

In contrast, category III of PIs is reported a little more frequently in patients with COVID-19 in the ICU (28.9% vs 32.5% - see Fig. 4 for details). We also wanted to know whether there is any difference among patients with APV or with ECMO regarding the category of PIs. We did not find any differences (see Table 3 for details).

We wanted to determine whether there was any association between the proportion of PIs in patients hospitalized in 2020 according to the month of hospitalization, both in the standard ward and the ICU (see Fig. 5 for details).

There is a higher proportion of PIs in patients hospitalized with COVID-19. Overall, for 2020, PIs were reported in 0.88% of hospitalizations. In patients hospitalized with COVID-19, PIs occurred in 2.62% of cases, whereas in patients hospitalized without concomitant COVID-19, PIs occurred in only 0.81% of cases. Also, patients admitted to the ICU with COVID-19 have a higher proportion of PIs than patients admitted to the ICU without COVID-19. Overall, in 2020, PIs were reported in 1.53% of ICU admissions. PIs occurred in 3.68% of patients hospitalized in ICUs with COVID-19, whereas PIs occurred in only 1.42% of patients hospitalized in ICUs without concomitant COVID-19. The final piece of information we were interested in was to determine whether and how the proportion of PIs in patients admitted with or without COVID-19 in 2020 varied by patient age. Again, we assessed data from standard wards and ICUs (see Fig. 6).

Even when considering the age structure, a higher proportion of PIs was observed in patients hospitalized with COVID-19 than in patients hospitalized without COVID-19 (1.05% vs. 0.46% using the 2013 ESP). The incidence of PIs was higher in patients with COVID-19 than in those without COVID-19 in all age categories, except patients younger than 20 years, where PIs occurred only in patients without COVID-19. A similar situation is observed in ICU hospitalization. A higher proportion of PIs

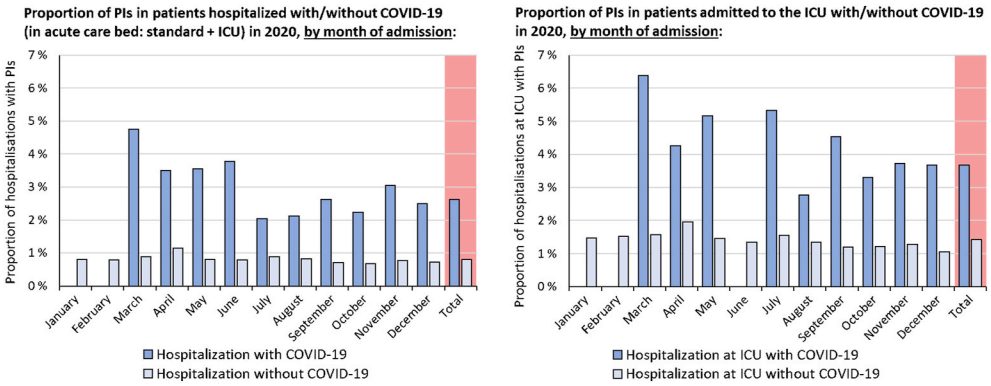

Fig. 5. The proportion of PIs in patients hospitalized with/without COVID-19 in 2020 by month of hospitalization.

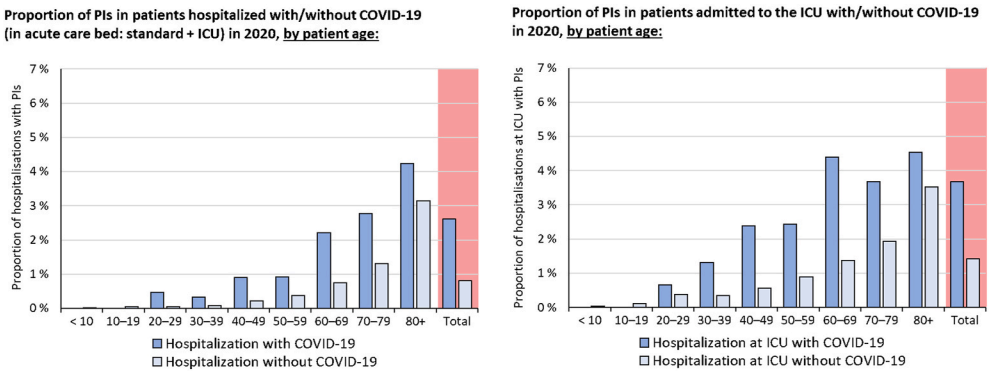

Fig. 6. The proportion of PIs in patients hospitalized with/without COVID-19 in 2020 by patient age.

has been observed in patients with COVID-19 than patients admitted to the ICU without COVID-19 (1.97% vs. 0.81% using the 2013 ESP).

During the first wave of COVID-19, COVID-19 patients tend to present a higher number of acute wounds, mainly of hospital origin, than the non-COVID group profile [24]. Prevalence of PIs on admission during the COVID-19 pandemic in the study by Kendall et al. [28] was increased when compared with the pre-COVID-19 period by 14.9%. There was no difference in the prevalence of PIs in the COVID-19 period between patients who were COVID-19-positive and COVID-19-negative (35.4% vs 35.7%). The study was made with a consecutive sample (n = 1125) of pre-COVID-19 admissions (n = 768) and COVID-19 period admissions (n = 357), including persons who were COVID-19-positive (n = 161) and COVID-19-negative (n = 196) [26]. Data in a study by Vowden and Hill [29] shows that the PIs rate per 1000 beds increased from a pre-pandemic level of around 1 to over 2.7 in the first month of the pandemic, with an increase in the device and prone position-related PIs, particularly in the expanded critical care patient population. Even though the bed occupancy decreased, the proportion of unstageable PIs increased, but there was little change in the number of Category 1 and 2 PIs [30].

The hospitalization mortality rate (proportion of hospitalizations ending in death in 2020) in acute care beds (standard + ICU) by patients with PIs and concurrently without COVID-19 was 21.2% and 38.2% by patients with both PIs and COVID-19. In the case of hospitalization only in the ICU mortality rate was 25.2% among patients with PIs and concurrently without COVID-19 and 40.4% among patients with both PIs and COVID-19. Thus, we can expect that the COVID-19 negatively impacts the patient's morbidity and mortality. Still, the impact of COVID-19 on the health and safety of patients, staff, and healthcare organizations, has yet to be fully uncovered [30].

4. Conclusion

The annual number of reported hospital admissions for patients with PIs in the last five years is between 14 and 15 thousand in the Czech Republic. ICU admissions for PIs patients have been stable at approximately 30%. The available NHIS data registered the first occurrence of COVID-19 in the Czech Republic in March 2020. Of the total number of hospital admissions with PIs in 2020 (n = 14,441), COVID-19 infection has been reported in 10.4% of the cases. Of the total number of ICU admissions with PIs in 2020 (n = 4386), COVID-19 occurred in 12.1% of the cases. A higher proportion of PIs is observed in patients hospitalized with COVID-19 than in patients hospitalized without COVID-19 (2.62% vs 0.81% overall). Similarly, in ICU patients, a higher proportion of PIs is observed in patients hospitalized with COVID-19 (3.68%) than in patients hospitalized without COVID-19 (1.42%). In both cases, a higher proportion of PIs in patients with COVID-19 can be observed within all 10-year age categories except for patients younger than 20 years, where PIs occurred only in patients without COVID-19.

Funding

This work was supported by the Ministry of Health of the Czech Republic under grant no. NU20-09-00094 ″Cost analysis of pressure ulcers treatment - determinant of care.” All rights reserved.

Data availability statement

The data supporting this study's findings are available in an anonymous form from the corresponding author upon reasonable request.

Declaration of competing interest

The authors stated that they have no competing interests.

Acknowledgements

We wish to acknowledge all the medical staff working on the front-line of COVID-19, who was also able to report the data about the patient status properly and also complications such as PIs.

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